REMARKS

Claim Amendments

Claims 1-16 were pending at the time of the Office Action. By the present amendment claim 9 (only) has been amended in minor manner for purposes of clarification. Therefore, claims 1-16 remain pending in this case.

Applicant has amended claim 9 to explicitly recite the implied words "the strengths of" before -- said demodulated data signals -- in this claim, for purposes of greater clarity. This amendment does not add any new matter to the application and support for the same is found in the specification as a whole and, more particularly, in the drawings and at page 8, lines 3-7 of the specification.

Specification Amendment

Applicant has amended the "Summary of the Invention" at page 4, line 29 of the specification to reflect the foregoing amendment to claim 9. As with said claim amendment, no new matter is added by this amendment.

35 U.S.C. §103(a) Rejections

Applicant respectfully requests reconsideration and withdrawal of the claim rejections by the Examiner having regard to the following submissions.

The Examiner has indicated that claims 1-7, 10-13 and 16 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over **Kaewell, Jr. et al.** in view of **Garner.** Further, the Examiner has indicated that claims 9 and 15 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over **Kaewell, Jr. et al.** and **Garner** as applied to claims 1-7, and further in view of

Gopalaswamy et al. Further, the Examiner has indicated that claims 8 and 14 would be allowable if rewritten in independent form to include the limitations of the base and intervening claims.

As set forth in MPEP 2143, in order to establish a *prima facie* case of obviousness, the Examiner must meet three requirements: First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; second, there must be a reasonable expectation of success; and thirdly, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

With respect to the first requirement, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. Additionally, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Although a prior art device may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.

For the following reasons Applicant respectfully submits that **Kaewell, Jr. et al.** and **Garner.** and/or **Gopalaswamy et al.** do not disclose, teach or even suggest Applicant's invention whether viewed alone or in combination. Further, there is no motivation to modify these references to provide the features of independent claim 1 of this application.

Applicant claims a combiner, for use in a spatial diversity radio receiver which receives multiple data signals through spaced apart antennae, which includes: (a) means for receiving strength-indicative signals, each strength-indicative signal being indicative of the strength of one of the received data signals, and demodulated data signals; (b) means for generating control signals responsive to the strength-indicative signals and; (c) means for combining, in linear proportions determined by the control signals, those demodulated data signals which are both above a predetermined combiner strength threshold level and differ in strength by less than a predetermined margin (e.g., a margin between 3dB and 12dB), to provide a combined output data signal. The demodulated data signals are thereby combined in linearly proportional amounts determined by the amounts by which they differ relative to that predetermined margin. As a result, the combiner defined by claim 1 is able to provide an optimally combined output data signal of which the greatest proportion is of the strongest of the received data signals, by effective, yet non-complex means in comparison with the prior art.

Kaewell, Jr. et al. discloses FM post-detection (i.e., post-discriminator) combining that is hybrid, meaning that it has an ability to combine signals from various receivers based on soft weighting information, as in a maximal-ratio-type combiner, or on hard weighting information, as in a switching-type combiner (see column 1, lines 65-68 to column 2, lines 1-2) or some combination of the two. For the maximal-ratio combining **Kaewell, Jr. et al.** uses normalized RSSI signals for the received data signals, i.e., normalized with respect to the average of their sum, to weight the received data signals, via multipliers, before combining the weighted data signals (see column 2, lines 45-61). Since the normalized RSSI signals are directly used to provide the combining gains, this in fact acts as a type of AGC (automatic gain controller). For the switching combining, **Kaewell, Jr. et al.** monitors a threshold signal-to-noise ratio (SNR) level of the data signals, using a

high frequency energy "click" detector in the form of a high pass filter, and the received data signals are either weighted or switched on the basis of the inverse of the measured "click" power of each received signal, i.e., on the basis of the input SNR (see column 1, lines 62-68 to column 2, lines 1-44). By contrast, Applicant's claimed invention uses very different criteria (i.e., very different processing means) to combine the received signals when they are combined and when they aren't combined (due to one or both being too weak) the decision to not use either or both signals is not in any manner based on its frequency content but, rather, on the relative strengths of the two signals.

In **Kaewell, Jr. et al.** each received demodulated signals is used (combined) in proportion to its SNR and this simply reflects conventional (known) maximal-ratio combining. Further, **Kaewell, Jr. et al.** discloses using switches (45,46) which are activated by a high frequency power ("click") detector and this represents a very different and contrary direction to Applicant's claimed invention in which either signal is discarded only if it is weaker than the other by some pre-defined power margin. In view of these different directions, it is respectfully submitted that **Kaewell, Jr. et al.** neither discloses nor suggests Applicant's claimed invention but, instead, points in a totally contrary direction.

Garner discloses pre-detection (i.e., pre-discriminator) IF combining and, therefore, co-phasing is required. Because **Garner** operates at the pre-detection level, it is subject to a different set of constraints than that of Applicant's invention. In **Garner** the IF signals are either combined with equal weight or one or the other is squelched, i.e., switched-off (via a ramp effect which, for practical implementation reasons associated with the pre-discrimination stage of **Garner**, are not applicable to Applicant's invention) (see column 2, lines 41-53; column 3, lines 3-26; column 4, lines 1-9; and Table 1). The combining of **Garner** is done after each signal has been passed through an automatic gain controller (AGC) and the criteria applied, to squelch a signal "on" or "off", are

based on the gains of the AGC and a "signal dispersion" detector, neither of which criteria is present or applicable to Applicant's present invention. Applicant's combiner does not, in any manner whatsoever, squelch the signals to be combined or use "signal dispersion".

In **Garner** both signals are used equally (i.e., 50-50) until one signal is faded to such an extent that its strength relative to the other is less than a threshold. At this point, the weak signal is squelched, i.e., turned "off" and its contribution passes from 50% to 0% at once (i.e., in a single operation, notwithstanding that this is done via a ramp to get from 50% to 0% rather than absolutely instantaneously) such that there is no further combining of the two signals at all and, instead, one or the other signal (only) is used. By contrast, Applicant's claimed combiner combines signals in linear proportions depending on their relative strengths. Thus, in Applicant's combiner (see Figure 4) the two signals may be combined at one point in time in a proportion of .9 from a first channel and .1 from the other channel, followed by a proportion of .8 from that first channel and .2 from the other, followed by a proportion of .7 from that first channel and .3 from the other, and so on, in a linear (i.e., continuous) manner.

More specifically, as set out on pages 8-9 of Applicant's specification, provided that the power level signals (dBm1 and dBm2) indicative of the dBm levels of the original RSSI signals for each received signal signals differ by less than the margin (e.g., 6dB), the received signals (RXD1 and RXD2) are summed by combiner circuitry (38) to provide a combined RXD signal according to the expression: combined RXD = α x RXD1 + (1 - α) x RXD2, where 0. α. 1, α = 0.5 + (dBm1 - dBm2)/(2 x margin). So, unlike **Garner** which completely turns off a signal once it drops below a fixed threshold amount, Applicant's combiner utilizes both signals, in a continuous, linear manner, such that the contribution of the fading signal becoming less and less (but not simply "on" per **Garner's** 50% or "off" per **Garner's** 0%) until such time as a relative strength margin, between the

two signals, is exceeded, at which point the fading signal provides no further contribution at all to the output signal and, instead, the other signal alone is used. Put another way, **Garner** applies a discrete threshold to each signal and this results in a removal (by squelching) of a degraded signal once it reaches that threshold whereas no such discrete threshold is applied to each signal in Applicant's combiner and, instead, the contribution of a fading signal continues and gradually diminishes, according to a linear relationship, until a threshold relative difference between both (or all) signals, is reached. Neither the operation nor the effect of Garner's combining, as compared to those of Applicant, is comparable.

Accordingly, **Garner** (like **Kaewell, Jr. et al.**) neither discloses nor in any manner suggests Applicant's combining criteria, per subparagraph (c) of claim 1, whereby those demodulated data signals which are both above a predetermined combiner strength threshold level and differ in strength by less than a predetermined margin (e.g., a margin between 3dB and 12dB) are combined, in linear proportions determined by the control signals, to provide a combined output data signal. Further, it follows from this that no combination of these cited references can be said to point to, or lead to, Applicant's said combining criteria. Moreover, and in any event, there is no reasonable basis on which to combine these two references as they relate to very different systems viz. one pertaining to pre-detection and the other to fm post-detection.

The Examiner's third-cited reference, to **Gopalaswamy et al.**, is cited against dependent claims 9 and 15 which add DC bias compensation means to the combiner and receiver, resp., claimed by independent claim 1 and claims dependent thereon. **Gopalaswamy et al.** pertains to a totally different application than Applicant's claimed invention viz. magneto-resistive heads of a data storage device, not diversity reception. Consequently, it is submitted that there is no motivation or reasonable basis on which to combine any teaching of this reference with those of either **Kaewell,**

Jr. et al. or **Garner**. Moreover, the method disclosed by **Gopalaswamy et al.** is very different from the foregoing combining criteria applied by Applicant's claimed invention. According to **Gopalaswamy et al.** the DC is compensated by means of a very different scheme, using very different criteria. In Applicant's invention, the strength of the signals is used because this is indicative of the SNR ratio of the demodulated signals, whereas **Gopalaswamy et al.** uses the signal level itself.

For the foregoing reasons, it is respectfully submitted that the cited references point in very different directions than Applicant's invention which, by claim 1, defines a combiner which provides an optimally combined output data signal of the received data signals, in linear proportions, i.e., such that the greatest proportion is of the strongest signals, when the strength of the signals does not differ by more than a predetermined margin, and not simply either an equal combining of those signals, or squelching of one signal to leave only the other, per **Kaewell, Jr. et al.** No combination of the cited references can be construed to point to Applicant's invention.

In light of the above remarks, Applicant submits that the Examiner has not, and cannot, establish a *prima facie* case of obviousness with respect to independent claim 1. Reconsideration of the obviousness rejection is therefore respectfully requested.

Applicant notes that if independent claim 1 is non-obvious under 35 USC 103 then any claim depending therefrom is non-obvious [see *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988)]. Applicant submits that the pending dependent claims are therefore allowable.

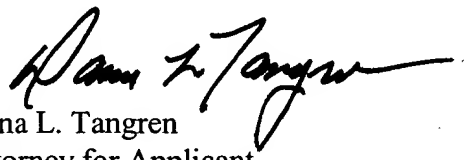
CONCLUSIONS

For all the foregoing reasons, Applicant respectfully submits that claims 1-16, with claim 9 as amended herein, pending in this application are in good order and ready for allowance.

Reconsideration of the Office Action and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned agent, Dana L. Tangren, at (801) 533-9800, to discuss resolution of any remaining issues.

Dated this 10 day of February 2004.

Respectfully submitted,



Dana L. Tangren
Attorney for Applicant
Registration No. 37,246
Customer No. 022913

DLT:dfw
W:\13587\9\DFW0000009404V001.DOC